THE ETIOLOGY OF CERTAIN CONGENITAL TUMORS OF THE GROIN.

THEIR RELATIONSHIP TO HERNIAL SACS.

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In 1896, by one of the curious coincidences that often arise in Surgical Work, there came under my care at the Melbourne Hospital for Sick Children, two cases of benign tumor of the groin, evidently similar in nature, the etiology of which was at the time quite unknown to me.

The notes of the cases are as follows:

Case I.—Boy, aged 6, with a tumor the size of half an orange at the upper part of the left thigh, a little below the femoral opening. Soon after birth a small lump was noticed there, but it had gradually and very slowly enlarged. The tumor was occasionally the seat of attacks of pain and tenderness; these attacks had been somewhat more frequent of late, and were attended with some enlargement of the tumor, which enlargement would subside as the attack passed off. The tumor gave the sensation of a soft solid, but there was no lobulation and no attachment to the skin. After removal it was found to be not encapsuled, and presented the appearance of a mass of fatty tissue, loosely held together by a fibro-areolor reticulum; in the centre of the tumor there was a single cyst with clear fluid contents. Our pathologist, Dr. Mollison, reported that microscopic examination showed in addition to the fibro-fatty tissue, a large admixture of unstriated muscle fibre.

Case II.—Boy, aged 5, presented a diffuse mass involving the upper and inner part of the left thigh and groin, extending upwards and inwards over Poupart's ligament to the hypogastric and inguinal regions. As in the first case, the tumor appeared to be slowly increasing in size, and the child suffered occasionally from tenderness and discomfort. The operation of removal entailed a somewhat extensive dissection, but the following characters were noteworthy. Emerging from the femoral canal, where it was thin and stalk-like, it passed upwards and inwards in the manner described, spreading out fan-like over the pubic and inguinal regions. It contained a large number of cysts, which formed a continuous series from the femoral canal to the fan-shaped mass above, throughout which they were irregularly distributed, as depicted in the diagram. The structure of the tumor was reported by Dr. Mollison to be identical in nature with that of the former case. There is no record of any special examination of the minute structure of the walls of the cysts. The accompanying diagram (Fig. 1) will serve to show the positions occupied by the two tumors, which were both on the left side.

It is worthy of mention that Case I came again under my care six years later for a right inguinal hernia. The result of the first operation had remained perfectly satisfactory. Case II I have been unable to trace.

From the circumstance that I have met with no other examples than these in my experience, I gather that such tumors must be of great rarity, though doubtless other surgeons may be able to recall similar cases. I am not, however, aware that these growths have been specially described nor that any suggestion as to their etiology has been offered. It has accordingly been a matter of great interest to me to find the explanation of the occurrence of these singular tumors incidentally provided in the course of some clinical observations I have been enabled to make during the last few years on the origin of the femoral hernial sac.

There appears to me no reasonable doubt that the etiology of these tumors is identical with the etiology of the femoral sac. As, however, the congenital origin of the femoral sac is not as yet universally admitted, may I be permitted in the first place briefly to outline the views I have already expressed fully on two previous occasions in the *Lancet*, as to the nature and congenital mode of occurrence of the femoral sac? I

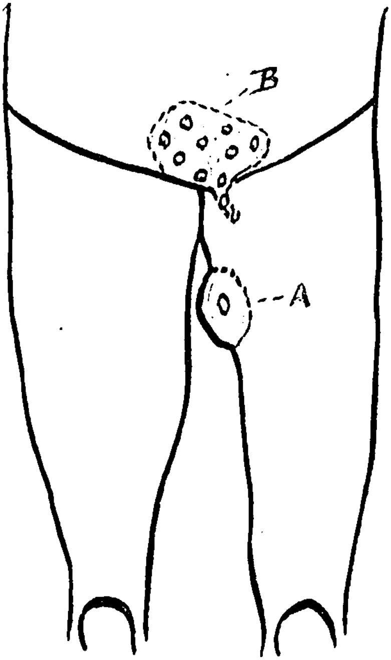

FIG. 1.—Showing position of the tumors in the two cases. *A*, Tumor in Case I. *B*, Tumor in Case II.

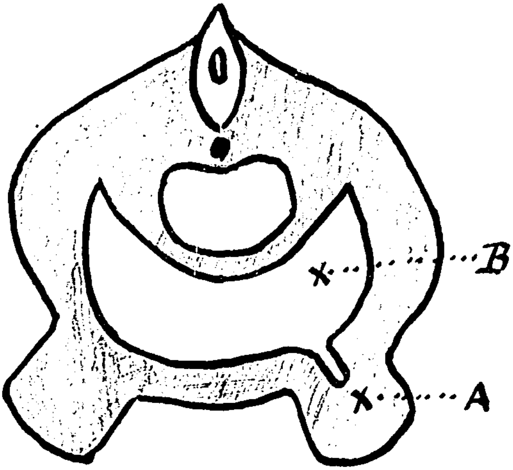

FIG. 2.—Diagram of embryo in section at about second month. *A*, Limb-bud with pouch from pleuroperitoneal cavity. *B*, Pleuroperitoneal cavity.

cannot do better than by giving verbatim one or two short extracts from a paper on the congenital origin of Hernia: (*Lancet,* March 12, 1904.)

"At an early period of embryonic development, the three primary layers of the embryo become arranged in the manner depicted diagrammatically in Fig. 2. Ventrally, two main layers are formed, the somatopleure closing in the primitive alimentary canal, and the splanchnopleure constituting the body-wall. Between these two layers is situate the primitive pleuro-peritoneal cavity, enclosed throughout by mesodermic tissue, on the inner surface of which a layer of cells, flattened and stratified, will ultimately become specialized as the endothelial structure of the peritoneum. During the second month, bud-like projections are extruded from the surface of the body-wall, which are the rudiments of the four limbs. These buds are projections of the whole thickness of the body wall, and it may quite probably be a normal event for a pouch of peritoneum to be included in the bud (Fig. IIA), and to become subsequently obliterated. Whether this inclusion of a pouch of peritoneum is a normal event, or whether it is a developmental accident, matters not at all. That which does concern us is the fact that such a pouch of peritoneum is not only often formed but that it often persists; further that it may occur in more than one situation in the limb but that its most frequent seat is in the immediate vicinity of the main vessels, in the future crural canal. This peritoneal pouch having been formed at a very early period, it becomes a matter of extreme interest to trace its destiny, and see how it will fare during the period of rapid changes associated with the developing limb.

I have been accustomed to show that the course so frequently seen to be taken by a femoral hernia upwards on to the abdomen, which has been a source of so much perplexity to surgeons, is in reality nothing more than the inevitable result of the congenital origin of the femoral sac. I have illustrated this by a diagram (Fig. 3), which depicts the result of the evolution of the limb upon the branches of the common femoral artery.

"The explanation of the somewhat retrograde course pursued by these becomes very evident if we refer back to the first beginnings of a vascular system in the embryonic limb-bud. The first branches that are given off from the main vessel of the limb-bud will be apportioned to structures that are destined to form part of the abdominal wall, so that when, in the course of development, the groin becomes deepened, and the limb undergoes changes that are to fit it to straighten out, it will at once be seen how it comes about that the superficial epigastric artery and its fellows follow the course they do. A little twig passing directly upwards will ultimately become the superficial epigastric; another with a slightly outward tendency will become the circumflex iliac, and one or two passing somewhat inwards, the external pudics.

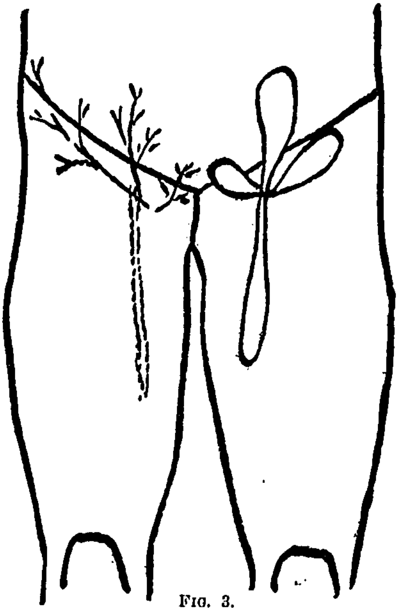

FIG. 3.

"And now that we have arrived at a conclusion as to the causes that have determined the course of the branches of the common femoral, it would seem reasonable to expect that a contemporaneous peritoneal sac, occupying a similar position in the evolving limb, should, in response to the same developmental influences, incur a like fate. So that one sac, which is of sufficient length, and suitably disposed at its inception, would assume a position similar to that of the epigastric artery; another, in like manner, will display an outward and upward direction like the circumflex iliac; while yet another will follow a course corresponding to that of the external pudics; and this is exactly what we find.

"It is impossible to look at Fig. 3, which represents the branches of the femoral artery on one side, and the favorite positions assumed by femoral sacs on the other, without being impressed with the conviction that the developmental influences which determine the course of the arteries on the one hand, and the position of the hernial sacs on the other, are identical."

Thus it is clear that any structure which at the first appearance of the limb-bud should chance to be placed as it were on the borderland between the future limb and the future abdominal work, will inevitably in the completed process of development come to have one end in the limb and the other in the abdominal wall, and will thus occupy precisely the position of the branches of the femoral artery, and also of the hernial sacs that pass upwards, from the femoral opening across Poupart's ligament. Moreover, I submit that in no other way than that here suggested, could any anatomical structure come to occupy such a position.

The correctness of this view as to the etiology of the sac of femoral hernia has been confirmed by a quantity of clinical evidence which it is unnecessary for me to re-state here. There is, however, one or more short quotation which I will make from a paper from which the previous extracts have been taken. This deals with the structure of the femoral sac, and has a very direct bearing upon the subject before us, and is as follows:

"It (the femoral sac) is often a thick structure, lined it is true with endothelium continuous with the peritoneum, but com-

> prising in addition a quantity of unstriated muscle fibre, fibrous tissue and fat."

It will be noted that the tumors I have described are identical in composition with the femoral sac as here described, with the sole addition of certain cysts. In addition to their structure the positional arrangement of the tumor in Case II furnishes conclusive evidence of its mode of origin. In Case I, taken alone, the position of the tumor would have afforded evidence that was merely inconclusive.

The cysts still remain to be accounted for. Assuming the suggested origin of these tumors from a diverticulum of the primitive pleuro-peritoneal cavity to be correct, have we any direct evidence bearing upon the origin of the cysts ? I myself have met with but one instance in which a cyst has been formed in the wall of a hernial sac. This was, however, the funicular process, and the case is described in the paper from which I have already quoted. Cysts in connection with hernial sacs have occasionally but very rarely been described, but one case that occurred in the practice of the late Mr. Hulke presents features of special interest. I am indebted for the description of it to Macready's "Treatise on Ruptures," from which I will extract a few lines:

> "During the operation for a strangulated femoral hernia a 'glistening membranous bag came into view.' The membranous bag was opened and serum escaped. The interior was a smooth-lined cavity whose posterior wall was convex, tense, elastic, in some parts blue and thin, in others glistening, white and tendinous. It was overrun by a net of large veins. At first sight this resembled an ovarian cyst, but on tracing its convex surface it seemed everywhere adherent at the periphery. It was opened and a few drachms of clear serum were let out. In the floor of this second cyst a third, still deeper and distinctly limited sacciform space was discovered, which also contained serum. Through the posterior wall of this third cyst a small globular body about the size of a grape was felt which proved to be the true sac."

Summary.—The congenital origin of the femoral hernial sac is shown by (1) its composition, especially by the presence of a thick fibro-fatty covering containing a quantity of unstriated muscle fibre; (2) by the various positions it assumes, especially in passing upwards on to the abdomen; (3) by various other characteristics which are matters of clinical observation and have been dealt with elsewhere. From the study of these features we deduce the conclusion that the femoral sac is formed by the inclusion in the embryonic limb-bud of a diverticulum from the primitive pleuro-peritoneal cavity with its mesoblastic wall.

Turning to the two tumors, they are obviously identical in nature one with the other, and both by their position and structure they proclaim their identity in origin with the femoral sac. It would, therefore, seem reasonable to conclude that they also owe their origin to the accidental inclusion in the embryonic limb-bud of a diverticulum from the primitive pleuro-peritoneal cavity.

REFERENCES.

Lancet, May 31, 1902, p. 1519.
Lancet, March 12, 1904, p. 707.